RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2000

BUDGET ACTIVITY: 03 - Advanced Technology Development

PE NUMBER AND TITLE: 0603202F Aerospace Propulsion Subsystems Integration

PROJECT: 63668A

COST ($ in Thousands)		FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
63668A	Aircraft Propulsion Subsystem Integration	25,150	19,586	34,440	32,161	32,353	27,080	23,423	Continuing	TBD
	Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0

(U) A. Mission Description

This program develops and demonstrates gas turbine propulsion system technologies applicable to a broad range of aircraft. The Aircraft Propulsion Subsystem Integration (APSI) program includes demonstrator engines such as the Joint Technology Demonstrator Engine (JTDE) for manned systems and the Joint Expendable Turbine Engine Concept (JETEC) for uninhabited air vehicle and cruise missile applications. These demonstrator engines apply the core technology developed under the Advanced Turbine Engine Gas Generator (ATEGG) program coupled with affordable and durable system component technology such as low pressure fans and low pressure turbines (LPT), engine controls, and nozzles developed as part of APSI. This program also focuses on system integration aspects of inlets, nozzles, engine/airframe compatibility, and low-observable technologies. APSI will provide aircraft with potential for longer range and higher cruise speed with lower specific fuel consumption; surge power for successful engagements; high sortie rates with reduced maintenance; reduced life cycle cost; and improved survivability resulting in increased mission effectiveness. The APSI program supports the demonstration of performance, cost, and durability goals of the Integrated High Performance Turbine Engine Technology (IHPTET) program. IHPTET is a three phase, totally integrated DOD, Defense Advanced Research Projects Agency (DARPA), National Aeronautics and Space Administration (NASA), and industry initiative focused on doubling turbine engine propulsion capabilities while reducing cost of ownership. The IHPTET program structure provides continuous technology transition for military turbine engine upgrades and derivatives and has the added benefit of enhancing the U.S. turbine engine industry's international competitiveness.

(U) FY 1999 ($ in Thousands)

(U) $3,404 Designed, fabricated, and demonstrated controls technology for turbofan/turbojet engines for improved performance and reduced maintenance of current and future Air Force aircraft.

(U) $8,320 Designed, fabricated, and demonstrated durability and integration technology for turbofan/turbojet engines for improved supportability and affordability of current and future Air Force aircraft.

(U) $9,279 Designed, fabricated, and tested technology demonstration engines for improved performance and fuel consumption of turbofan/turbojet engines for fighters, aircraft, bombers, and transports.

(U) $4,147 Designed, fabricated, and tested technology demonstration engines for improved performance, durability, and affordability of engines for missile and uninhabited air vehicle applications.

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(U) A. Mission Description Continued

(U) FY 1999 ($ in Thousands) Continued

(U) $25,150 Total

(U) FY 2000 ($ in Thousands)

(U) $4,350 Design, fabricate, and demonstrate durability and integration technologies for turbofan/turbojet engines for improved supportability and affordability of current and future Air Force aircraft. Initiate engine testing in support of the national High Cycle Fatigue (HCF) program including fan blade damage tolerance, frangible bearings, prognostics and health management, and F119 explosive blade out concept demonstration.

(U) $11,625 Design, fabricate, and test advanced component technologies for improved performance and fuel consumption of turbofan/turbojet engines for fighters, bombers, and transports. Complete advanced engine designs for fixed inlet guide vanes and Moderate Aspect Ratio (MAR) rotor, Integrally Bladed Rotor (IBR) repair, fan rim damper, HCF mistuning technologies, vaneless counterrotating high/low pressure turbine (LPT), probabilistic rotor system design, gamma titanium aluminide LPT coverplate, sprayform cast hardware, and Ceramic Matrix Composite (CMC) technologies. Initiate advanced engine designs for HCF robust front frame, two-stage forward swept fan, tiled LPT blade, uncooled CMC LPT blade, and model-based control with diagnostics. All of these technology innovations are applicable to a significant part of the Air Force engine inventory along with future engines including JSF F-119 and F-120 designs.

(U) $3,611 Design, fabricate, and test advanced component technologies for improved performance, durability, and affordability of engines for missile and uninhabited air vehicle applications. Complete engine testing of shrouded forward swept fan, low-cost ceramic hot section, low-cost rapid prototyping and high-speed machining, hybrid ceramic bearings, and high temperature transpiration cooled combustor. Initiate design of Organic Matrix Composite (OMC) fan, high stage loading splittered fan, uncooled ceramic high/low pressure turbine, and slinger combustor

(U) $19,586 Total

(U) FY 2001 ($ in Thousands)

(U) $5,363 Design, fabricate, and demonstrate durability and integration technologies for turbofan/turbojet engines for improved supportability and affordability of current and future Air Force aircraft. Complete engine testng in support of the National HCF program including fan blade damage tolerance, frangible bearings, prognostics and health management, and F119 explosive blade out concept demonstration

(U) $22,319 Design, fabricate, and test advanced component technologies for improved performance and fuel consumption of turbofan/turbojet engines for fighters, bombers, and transports. Fabricate and full-engine test fixed inlet guide vanes and MAR rotor, IBR repair, fan rim damper, HCF mistuning technologies, vaneless counterrotating high/low pressure turbine, probabilistic rotor system design, gamma titanium aluminide LPT coverplate, sprayform cast hardware, and CMC technologies. Continue advanced engine designs for HCF robust front frame, two-stage forward

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(U) A. Mission Description Continued

(U) FY 2001 ($ in Thousands) Continued

swept fan, tiled LPT blade, uncooled CMC LPT blade, and model-based control with diagnostics. All of these technology innovations are applicable to a significant part of the Air Force engine inventory along with future engines including JSF F-119 and F-120 designs.

(U) $4,731 Design, fabricate, and test advanced component technologies for improved performance, durability, and affordability of engines for missile and uninhabited air vehicle applications. Continue design of OMC fan, high stage loading splittered fan, uncooled ceramic high/low pressure turbine, and slinger combustor.

(U) $2,027 Design, develop, and test integrated propulsion designs to demonstrate performance and durability of advanced hypersonic propulsion concepts in support of Defense Advanced Research Projects Agency (DARPA) missile demonstration. Fabricate and test flight type scramjet engine. Document engine performance and structural durability.

(U) $34,440 Total

(U) B. Budget Activity Justification

This program is in Budget Activity 3, Advanced Technology Development, since it develops and demonstrates technologies for existing system upgrades and/or new system developments that have military utility and address warfighter needs.

(U) C. Program Change Summary ($ in Thousands)

		FY 1999	FY 2000	FY 2001	Total Cost
(U)	Previous President's Budget (FY 2000 PBR)	27,722	29,825	31,022	
(U)	Appropriated Value	27,814	19,825		
(U)	Adjustments to Appropriated Value				
	a. Congressional/General Reductions	-92	-2		
	b. Small Business Innovative Research	-880			
	c. Omnibus or Other Above Threshold Reprogram		-108		
	d. Below Threshold Reprogram	-1,551			
	e. Rescissions	-141	-129		
	f. Other				
(U)	Adjustments to Budget Years Since FY 2000 PBR			3,418	
(U)	Current Budget Submit/FY 2001 PBR	25,150	19,586	34,440	TBD

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(U) C. Program Change Summary ($ in Thousands) Continued

(U) Significant Program Changes:
Increased funding in FY 2001 reflects increased emphasis on turbine engine propulsion.

(U) D. Other Program Funding Summary ($ in Thousands)

(U) Related Activities:
(U) PE 0602203F, Aerospace Propulsion.
(U) PE 0603112F, Advanced Materials for Weapon Systems
(U) PE 0603216F, Aerospace Propulsion and Power Technology.
(U) PE 0602122N, Aircraft Technology
(U) PE 0603217N, Air Systems Advanced Technology Demonstration.
(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

(U) E. Acquisition Strategy

Not Applicable.

(U) F. Schedule Profile

(U) Not Applicable.